BLACK BOX®
NETWORK SERVICES

Take charge of difficult networking environments.

Communication and infrastructure solutions for

- » Factory floors
- » Traffic control
- » Public spaces
- » Industrial controls

Industry Technology Solutions

Industrial environments present much harsher conditions than are found in typical office environments. They not only often have extremes of temperatures, humidity, dirt, and corrosive materials, they may also contain devices such as motors and mechanical switches, which cause a large amount of electromagnetic interference (EMI).

The challenge with industrial controls as well as with other electronic devices intended for use in these environments is to have them function reliably in spite of adverse conditions.

This may mean using a device that's built to withstand harsh conditions, protecting the device in a specialized cabinet, or both.

In this brochure you will find a selection of solutions that are specifically designed for use in harsh environments.

If you are interested in a customized solution, please contact one of our technical specialists at 030-241 77 99 or techsupport@blackbox.nl.
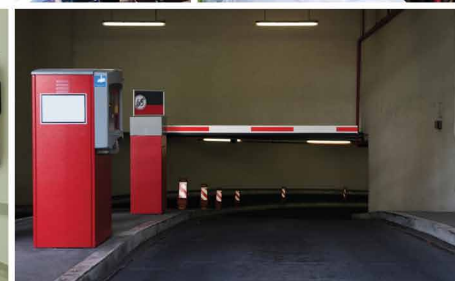
Highlights and new products:

High-end KVM switching in a compact 1U design.

The DKM FXC gives multiple KVM users fast, reliable access to high-quality, real-time digital video plus a whole host of peripherals across the enterprise.
See page 7.

Hardened Managed Ethernet Switches.

Tough, multiport switches that provide economical ways to move data quickly and reliably in harsh environments.
See page 9.

Safeguard your infrastructure and resources.

The ServSensor monitors your equipment's environmental variations, and notifies you through email, SMS or SNMP alerts in your network management system in advance to prevent any disaster.
See page 12.

Extend Ethernet Links between buildings wirelessly.

This kit gives you a quick way to extend an Ethernet link between buildings, without the hassle and expense of laying cables.
See page 21.

What's Inside

Free, live, 24/7 Tech Support.

Can we help you find the right solution or provide you with more in-depth advice?

Talk to an expert:

030-2417799   techsupport@blackbox.nl

Industrial environments present much harsher conditions than are found in typical office environments. They not only often have extremes of temperatures, humidity, dirt, and corrosive materials, they may also contain devices such as motors and mechanical switches, which cause a large amount of electromagnetic interference (EMI).

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Extended temperature range

Home and office electronics operate in climate-controlled rooms, but industrial devices are often subject to temperature extremes. Many industrial devices are installed outdoors in unventilated sealed enclosures, which freeze in the winter and heat to extremely high temperatures in the summer—think of a car's interior after it's been sitting in the sun on a hot day.

Industrial devices and their power supplies are expected to perform over a wide temperature range. Typically they're rated so you can select one appropriate to your environment. Temperature tolerances from -25 to +60° C are common and you can even find devices rated for extremes to -40 to +75° C.

Because industrial components are sealed against contaminants and also because they're often installed inside enclosures, they rely on air convection rather than fans for cooling.

Resistance to moisture and contaminants

Moisture is the enemy of electronic components, and industrial devices are often subject to water in all its forms from high humidity and condensation to drips and splashes. Industrial devices are also often subject to dirt, dust, oil, salt spray, and chemicals when they're installed outdoors or indoors in an environment such as a factory floor.

For these reasons, industrial components are usually housed in hardened metal cases that are sealed against contaminants including particulates such as airborne dust, as well as moisture, and sometimes chemicals.

Conformal coating is a special film or coating applied to electronic circuitry to provide additional protection from contaminants such as chemicals, dust, and moisture. Many Black Box industrial network components can be ordered with conformal coating. For availability, call our free Tech Support.

Another way to protect industrial devices from their environment is with an enclosure designed to seal out contaminants such as dust and moisture. These enclosures are usually NEMA rated to describe the amount of protection they provide. For more information about NEMA ratings, see .

Power supplies

Powering industrial control devices tends to be more complex than powering network devices intended for home, office, and data center use.

The power supplied to or used at industrial sites is widely different and can be 230Vac single-phase, 400Vac triple-phase of AC current or 24 or 48Vdc of DC current.

Industrial power may be three-phase power, which is used for power transmission across power grids and is favored for large motors and heavy loads at industrial sites. It's also frequently "dirty" power, subject to noise, voltage fluctuations, and spikes. This inconsistent power is hard on the electronic components in industrial devices and can cause equipment damage or data loss.

▶ Where to use industrial components

- Heavy industry and manufacturing
- Oil and gas industries, including refineries
- Self-storage facilities
- Utility substations
- Agriculture
- Military bases
- Research facilities
- Water treatment plants
- Factory floors
- Distribution centers
- Food service
- Municipal services
- Anywhere you need extra reliability

environments

Because of this variability, industrial control devices are either sold entirely separately from their power supply or are available with a choice of power supplies. Unlike ordinary networking devices, industrial controls require you to choose the correct power supply for both device and application.

Industrial power supplies must be matched to both the type of power input they'll be receiving from the power grid and the power output they'll be expected to provide to the industrial control device.

Although power input is often ordinary 230VAC standard European power, but industrial power supplies may be expected to accept AC power that ranges lower or higher may be single-phase or three-phase. DC power may also be available and may include 24VDCc and 48VDC.

Many industrial power supplies offer a universal input that will accept power across a wide range, typically 85–264 VAC, and 120–370 VDC. This not only makes them adaptable to many different power sources, but provides them with the resilience to withstand large fluctuations in power input while still providing stable, reliable power output.

On the output side, industrial power generally supplies 12 VDC, 24 VDC, or 48 VDC power to the device side. Most industrial control devices in North America and Europe take 24-VDC power.

Industrial power supplies typically have screw or spring-clamp terminal blocks for power connections.

EMI protection

Industrial areas are also prone to electromagnetic interference (EMI) and radio-frequency interference (RFI). Interference and noise from EMI/RFI creates unwanted signals that may interfere with network performance.

Devices for industrial applications are usually built to withstand higher EMI than those intended for office or data center use. Chassis are usually shielded, and EMI signals can be absorbed by using capacitor-based circuits or through special coatings as well.

Mounting

Components for office or data center use are usually either freestanding or mounted on 19" rails in a cabinet or rack. Industrial devices, on the other hand, are usually panel mounted by bolting them to a flat surface, or they may be DIN rail mounted.

DIN rail is an industry-standard metal rail that is used both wallmounted or rackmounted. Industrial devices mount directly on the rail or may come with separate DIN rail brackets. For more about DIN rail, see **page 5.**

NEMA ratings for cabinets

Enclosures designed to protect components against contaminants are a way to safeguard industrial devices. These enclosures are usually NEMA rated to describe the amount of protection they provide.

There are many numerical NEMA designations, but the most relevant ones are NEMA 3, NEMA 3R, NEMA 4, NEMA 4X, and NEMA 12.

NEMA 3 enclosures, designed for both indoor and outdoor use, provide protection against falling dirt, windblown dust, rain, sleet, and snow, as well as ice formation.

The NEMA 3R rating is identical to NEMA 3 except that it doesn't specify protection against windblown dust.

NEMA 4 and 4X enclosures, also designed for indoor and outdoor use, protect against windblown dust and rain, splashing and hose-directed water, and ice formation. NEMA 4X goes further than NEMA 4, specifying that the enclosure will also protect against corrosion caused by the elements.

NEMA 12 enclosures are constructed for indoor use only and are designed to provide protection against falling dirt; circulating dust, lint, and fibers; and dripping or splashing noncorrosive liquids. Protection against oil and coolant is also a prerequisite for NEMA 12 designation.
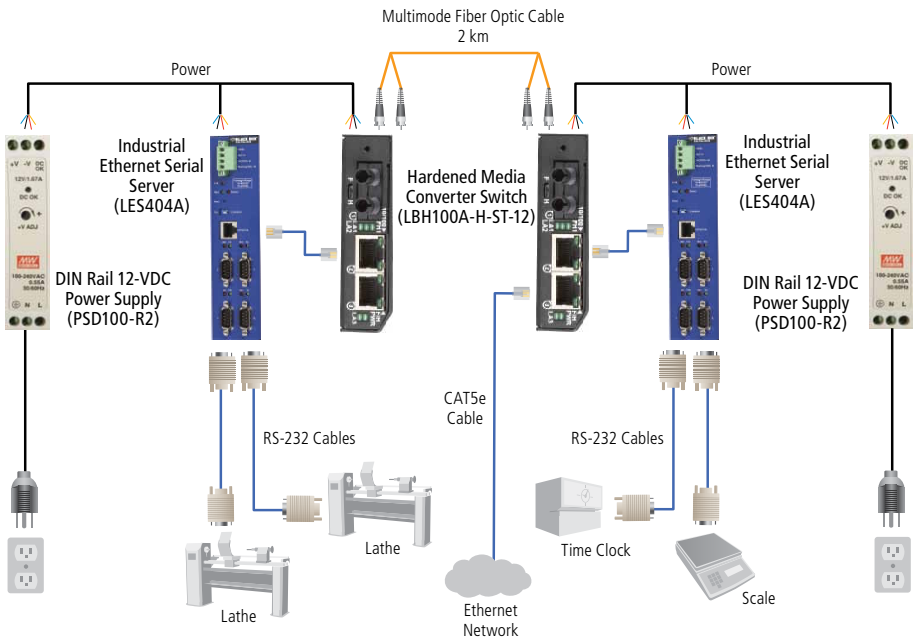
Making the connection to industrial

Industrial serial interfaces

Industrial control is a designation for the devices that interface with machinery such as welders, mixers, generators, lathes, and packaging machines. Although most of today's IT runs on Ethernet, industrial devices often use an RS-232, RS-485, or RS-422 serial interface.

RS-232 is a group of electrical, functional, and mechanical specifications for serial interfaces. It transmits data at speeds up to 115 kbps and over distances up to 15 m, although higher distances can be achieved by using special low-capacitance cable. Both sync and async binary data transmission fall under RS-232. Although the original RS-232 connector is DB25, DB9 and RJ-45 connectors are now common. Also, industrial devices often use a terminal block instead of a connector for the RS-232 interface. RS-232 is somewhat restricted as an industrial interface because of its restricted range and because it only supports point-to-point links.

The RS-422 supports point-to-point and multidrop applications at distances of up to 1200 meters. Up to 32 listening devices can be connected to and controlled from a single RS-422 port.

RS-485 is similar to RS-422 but supports multiple commanding devices as well as multiple listening devices at distances of up to 1200 meters.

Multimode Fiber Optic Cable
2 km

Power

Industrial Ethernet Serial Server (LES404A)

Hardened Media Converter Switch (LBH100A-H-ST-12)

DIN Rail 12-VDC Power Supply (PSD100-R2)

Industrial Ethernet Serial Server (LES404A)

DIN Rail 12-VDC Power Supply (PSD100-R2)

Power

CAT5e Cable

RS-232 Cables

RS-232 Cables

Lathe

Time Clock

Lathe

Ethernet Network

Scale

DIN Rail Serial Converter, Repeaters, and Fiber Driver

Industrial solutions for DIN rail serial connectivity.

- Converter optically isolates and converts unbalanced half- or full-duplex RS-232 signals to optically isolated and balanced full-duplex RS-422 or 2-wire half- or 4-wire full-duplex RS-485.
- Repeaters support speeds to 115.2 kbps.
- Fiber Driver enables any two async serial devices to communicate half- or full-duplex over two multimode ST® fibers at distances up to 4 km.

MED100A

Item	Code
RS-232↔RS-422/RS-485 DIN Rail Converter with Opto-Isolation	ICD100A
DIN Rail repeaters with Optp-Isolation	
RS-422/RS-485	ICD102A
RS-232	ICD103A
DIN Rail RS-232/RS-485↔Fiber Driver	MED100A

Industrial Ethernet Serial Servers

Access hard-to-reach remote serial equipment as if it were local.

- Control remote serial equipment across your Ethernet network.
- Slim-line DIN rail box is IP30 rated for use in dirty environments.
- Support RS-232, RS-422, and RS-485 serial interfaces.
- 4-screw power connector enables daisychaining of AC or DC power to multiple servers.

LES404A

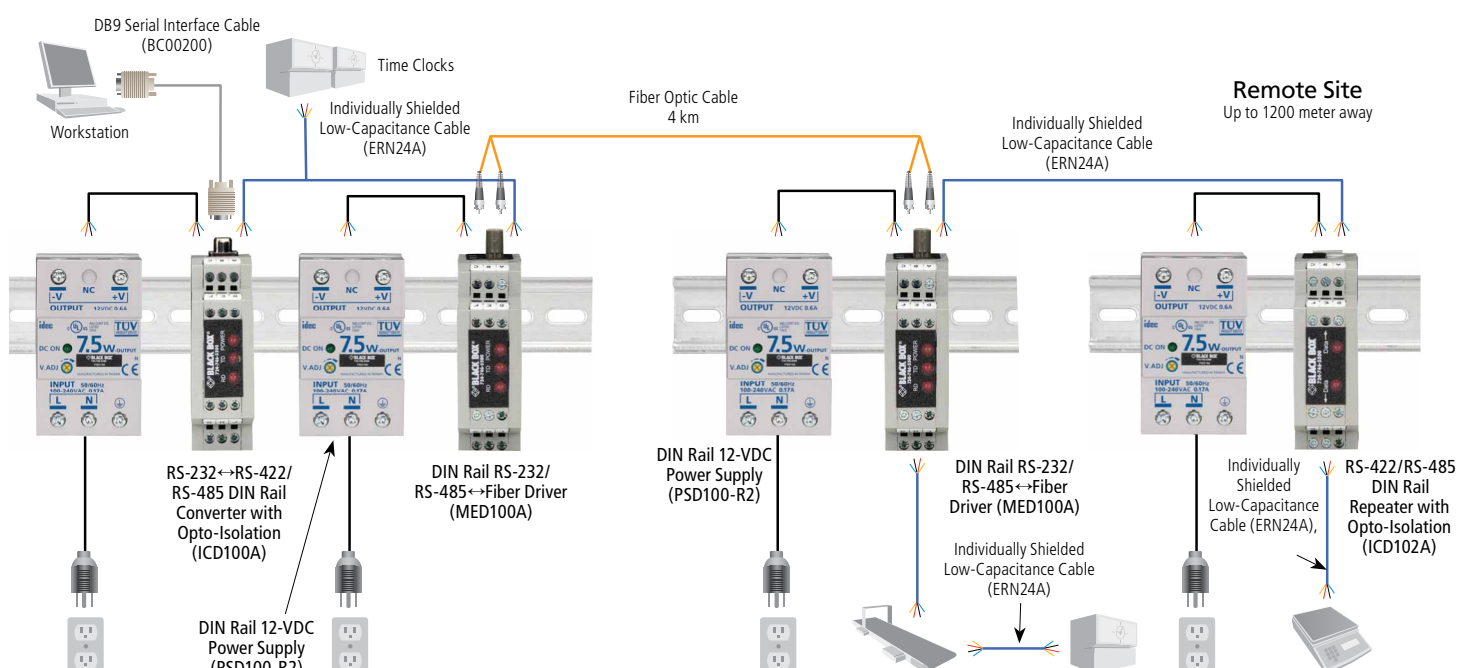| Item	Code
Industrial Ethernet Serial Servers	
1-Port	LES401A
2-Port	LES402A
4-Port	LES404A
You may also need…	
12-VDC DIN-Mount Power Supply	PSD100-R2

serial devices.

Serial servers

Serial servers enable you to use your network to connect to serial devices even over very long distances—as far as your network stretches. It's even possible to control serial devices across the Internet. Serial servers act as virtual serial ports by providing the appropriate connectors for serial data and also by grouping serial data in both directions into Ethernet TCP/IP packets. This enables you to control serial devices across Ethernet without the need for software changes.

DB9 Serial Interface Cable
(BC00200)

Time Clocks

Workstation

Individually Shielded
Low-Capacitance Cable
(ERN24A)

Fiber Optic Cable
4 km

Individually Shielded
Low-Capacitance Cable
(ERN24A)

Remote Site
Up to 1200 meter away

RS-232↔RS-422/
RS-485 DIN Rail
Converter with
Opto-Isolation
(ICD100A)

DIN Rail 12-VDC
Power Supply
(PSD100-R2)

DIN Rail RS-232/
RS-485↔Fiber Driver
(MED100A)

DIN Rail 12-VDC
Power Supply
(PSD100-R2)

DIN Rail RS-232/
RS-485↔Fiber
Driver (MED100A)

Individually Shielded
Low-Capacitance Cable
(ERN24A)

Individually
Shielded
Low-Capacitance
Cable (ERN24A),

RS-422/RS-485
DIN Rail
Repeater with
Opto-Isolation
(ICD102A)

Hardened Media Converter Switch, 10/-100-Mbps Copper to 100-Mbps Multimode Fiber, 12-VDC, ST

Media conversion for tough environments.

- Operating temperature range of -25 to +60° C.
- Has one 100-Mbps fiber port and two 10-/100-Mbps switch ports.
- Mounts on DIN rails with optional brackets or you can rackmount up to 16 units in the optional trays.
- Available in standard, hardened, and extreme versions with a wide range of fiber and power options. See more at **blackbox.nl**.

LBH100A-H-ST-12

Item	Code
Hardened Media Converter Switch, 10/-100-Mbps Copper to 100-Mbps Multimode Fiber, 12-VDC, ST	LBH100A-H-ST-12
DIN Rail Mounting Bracket	DIN-RAIL MC2
Powered Rackmount Tray	LH1505P-RACK

▼ DIN Rail

DIN rail is an industry-standard metal rail, usually installed inside an electrical enclosure, which serves as a mount for small electrical devices specially designed for use with DIN rails. These devices snap right onto the rails, sometimes requiring a set screw, and are then wired together. Many different devices are available for mounting on DIN rails: terminal blocks, interface converters, media converter switches, repeaters, surge protectors, PLCs, fuses, or power supplies, just to name a few.

A standard DIN rail is 35 mm wide with raised-lip edges, its dimensions outlined by the Deutsche Institut für Normung, a German standardization body. Rails may be cut for installation. Depending on the requirements of the mounted components, the rail may need to be grounded.

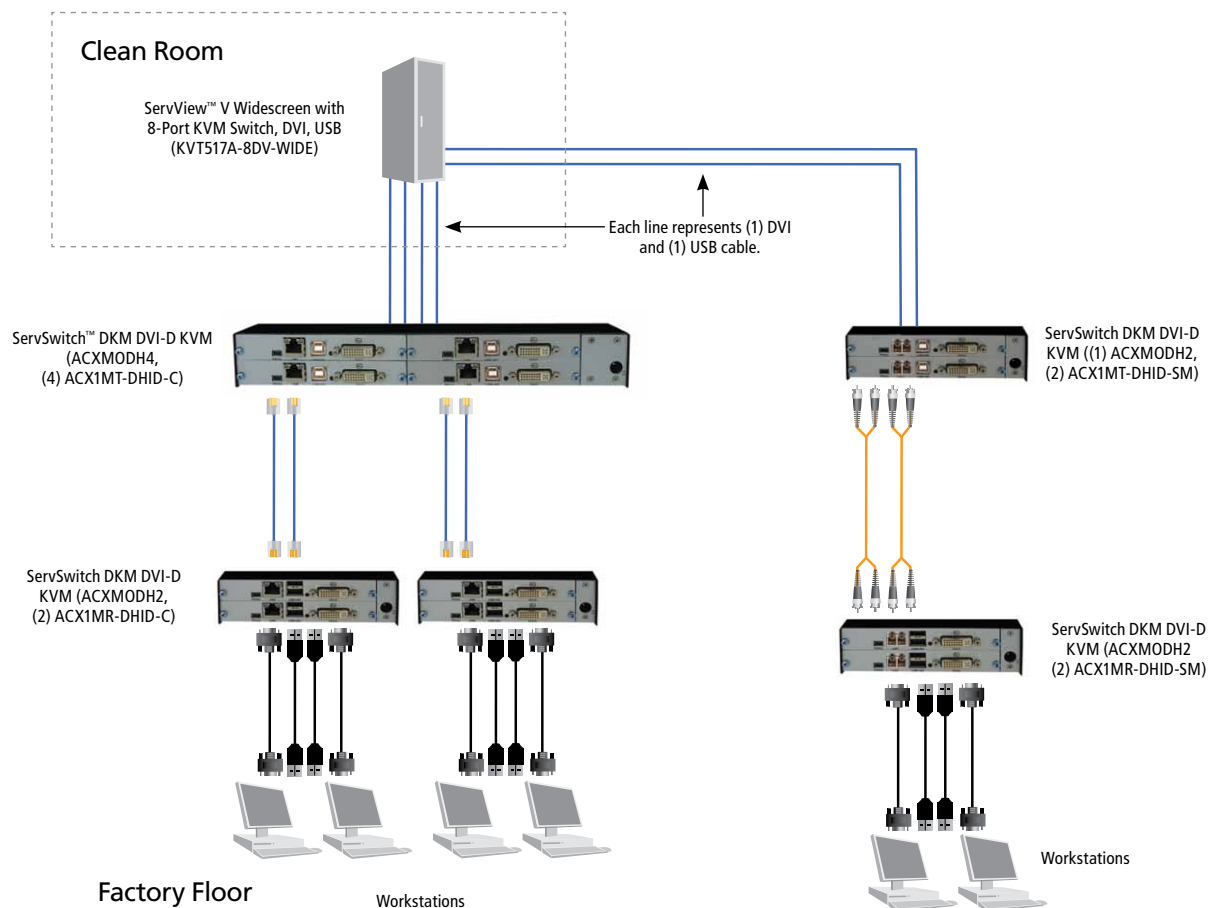| Item	Code
DIN Rail, 1-m	DR100

Keeping it clean at work.

Factories are dirty. Don't let them affect your CPUs.

Dirt. Dust. Water. Dangerous fluids. And lots of moving parts.

Factory floors are a CPU's worst nightmare.
But more and more, computers and servers are moving into the active centers of factories. With automation in factories, computers are about more than inventory and e-mail. Often they are running important equipment. Servers need to be connected and managed, sometimes from the factory floor, and they also need to be separate from unclean environments.

Industrial centers now isolate CPUs and servers in a clean room. Usually a keyboard-monitor-mouse setup is in a safer corner of the factory floor to enable server access. Industrial technology for factories is focused on extension and server access, and is moving into secure cables to prevent tripping and accidental disconnects.

There are many fiber optic solutions that ensure an interference-free environment.

Clean Room

ServView™ V Widescreen with 8-Port KVM Switch, DVI, USB (KVT517A-8DV-WIDE)

Each line represents (1) DVI and (1) USB cable.

ServSwitch™ DKM DVI-D KVM (ACXMODH4, (4) ACX1MT-DHID-C)

ServSwitch DKM DVI-D KVM ((1) ACXMODH2, (2) ACX1MT-DHID-SM)

ServSwitch DKM DVI-D KVM (ACXMODH2, (2) ACX1MR-DHID-C)

ServSwitch DKM DVI-D KVM (ACXMODH2 (2) ACX1MR-DHID-SM)

Factory Floor

Workstations

Workstations

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ServSwitch DKM FXC

High end KVM switching in a compact 1U design.

- High performance switch with instant Switching.
- Space saving with up to 48 ports in a 1U compact 19" chassis.
- Supports high-quality, full-frame DVI-D video.
- Rectangular switching system from 1 user to 15, 31, or 47 CPUs up to 47 users to 1 CPU.
- Connect user and CPUs via the latest DKM CATx Extenders over distances up to 140m.
- Can be used for fiber optic or copper networks.
- Redundant power supply.
- Optional Software Bundles for external control, Syslog/SNMP, seamless cascading etc.

ServSwitch DKM FXC, 48 port (ACXC48)

Call or visit blackbox.nl for more information.

ServSwitch™ DKM KVM Modular Housing and Extenders

A modular system of KVM extension and housing that uses CATx and single- or multimode fiber cabling.

- Pick from housings of 2-, 4-, 6-, or 21-slot chassis for mother- and daughtercards.
- A redundant power supply is available in some housings .
- The DKM extender setup provides the widest range of possible combinations, which makes it easy to customize for your specific application.

ACXMODH6R-R2

Call or visit blackbox.nl for more information.

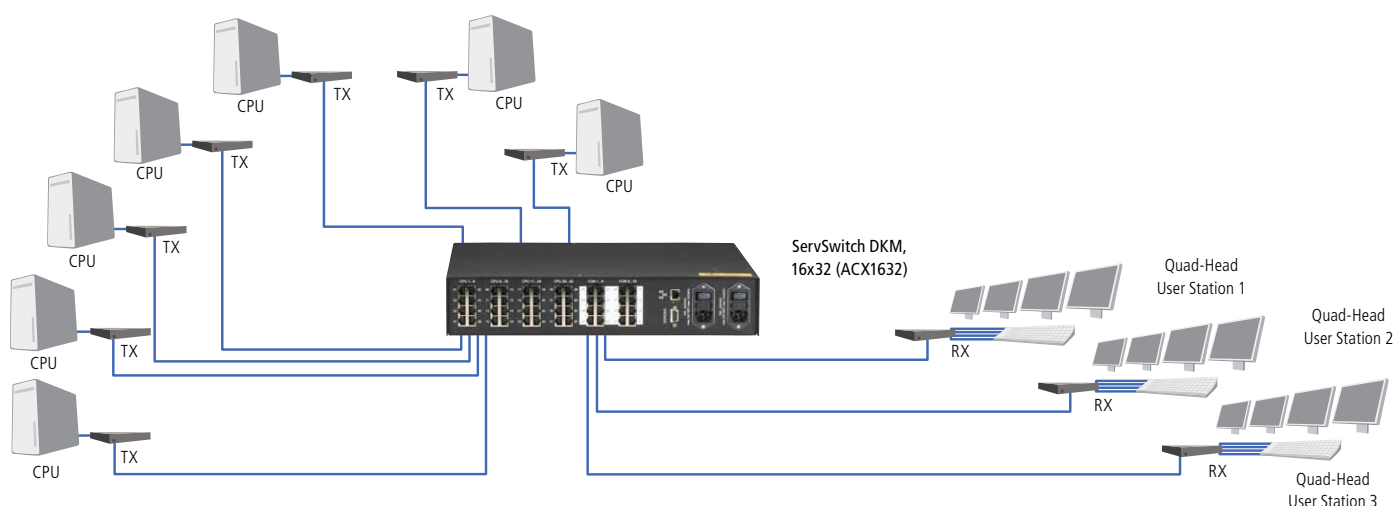## ServSwitch DKM DVI-D KVM Matrix Switch

Four modes of switching, plus extension over CATx or fiber.

- Virtually instantaneous switching ensures seamless signal delivery.
- Supports high-resolution DVI-D and USB-style keyboard/mouse, plus USB peripheral and audio options.
- Maximum resolution of 1920 x 1200 at 60 Hz.
- Uses CATx cabling, or single- or multimode fiber cabling

ACX1632

Call or visit blackbox.nl for more information.

CPU
CPU
CPU
CPU
CPU
CPU
CPU
CPU
TX
TX
TX
TX
TX
TX
TX
TX

ServSwitch DKM, 16x32 (ACX1632)

RX
RX
RX

Quad-Head User Station 1
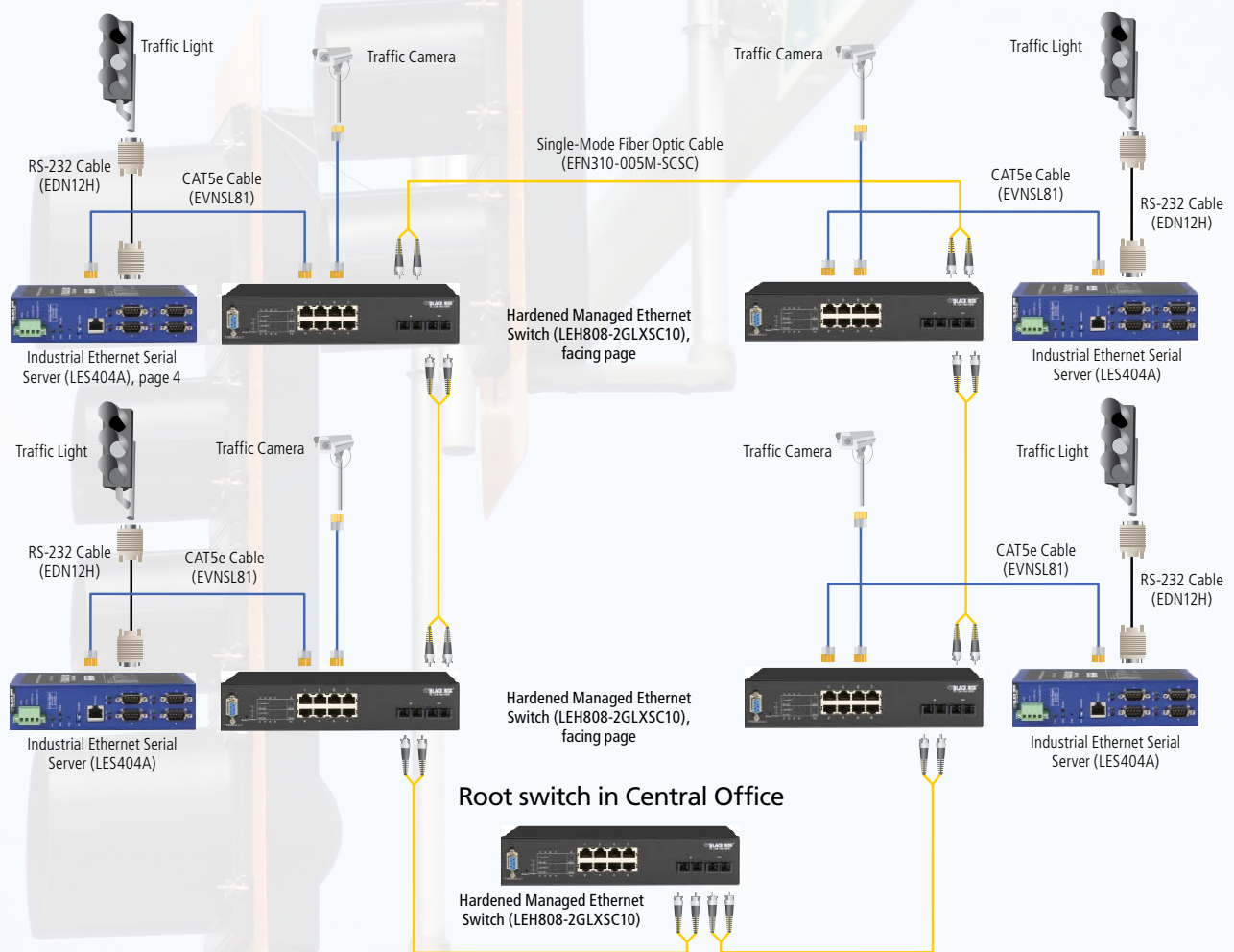Quad-Head User Station 2
Quad-Head User Station 3

Fiber ring topology provides both distance and resilience.

Although Ethernet is usually thought of as having a star topology, it's also possible to build an Ethernet network as a ring. This configuration has the advantage of providing a redundant pathway if a link goes down. A ring topology is often used in applications such as traffic signals and surveillance, where long distances may make it difficult to run fiber in a star formation from a central switch and where downtime must be minimized.

The key to the ring topology is spanning tree protocol. One switch—in this case, the switch in the central office—is the root of the spanning tree. A node on the opposite side of the ring blocks one of the ports leading back to the root switch, creating a topology that functions like a long line of Ethernet switches. If a link breaks, the network reorganizes itself to relink all the switches. Although this convergence isn't instantaneous, it takes only a few seconds to bring the network back.

In the diagram below, Hardened Managed Ethernet Switches create a ring topology that operates at Gigabit speed to support traffic cameras at the intersection. Industrial Ethernet Serial Servers make the connection from the switch to the serial interface on the traffic signals, enabling central management of the lights across the Ethernet network.

Traffic Light

Traffic Camera

Traffic Camera

Traffic Light

Single-Mode Fiber Optic Cable
(EFN310-005M-SCSC)

RS-232 Cable
(EDN12H)

CAT5e Cable
(EVNSL81)

CAT5e Cable
(EVNSL81)

RS-232 Cable
(EDN12H)

Hardened Managed Ethernet
Switch (LEH808-2GLXSC10),
facing page

Industrial Ethernet Serial
Server (LES404A), page 4

Industrial Ethernet Serial
Server (LES404A)

Traffic Light

Traffic Camera

Traffic Camera

Traffic Light

RS-232 Cable
(EDN12H)

CAT5e Cable
(EVNSL81)

CAT5e Cable
(EVNSL81)

RS-232 Cable
(EDN12H)

Hardened Managed Ethernet
Switch (LEH808-2GLXSC10),
facing page

Industrial Ethernet Serial
Server (LES404A)

Industrial Ethernet Serial
Server (LES404A)

Root switch in Central Office

Hardened Managed Ethernet
Switch (LEH808-2GLXSC10)

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NETWORK SERVICES

INDRy PoE

Power over Ethernet 10/100 switch with Gigabit Uplink for DIN Rails.

- 8x 10/100BaseTX Ports.
- 2 shared 10/100/1000BaseTX and SFP combi ports.
- Features alarm relay contact.
- Redundant 48 VDC power .
- Optional Management.
- DIN-Rail and wall mount design.

INDRy PoE is your industrial DIN Rail switch for providing PoE 802.3af to your edge devices. The switch offers eight RJ45 PoE Ports with full 802.3af compliance. For connections to your network backbone you may use two Gigabit/SFP Ports.

You can plug in Gigabit Fiber or 100Mbps Fiber SFP modules or use the 10/100/1000 RJ45 Copper Ports. LIE612A has additional SNMP allowing redundant Ethernet Rings.

LIE602A

Item	Code
INDRy PoE, managed	LIE612A
INDRy PoE, unmanaged	LIE602A

INDRy 1000

Industrial DIN RAIL Gigabit Switch.

- Offers 8x 10/100/1000BaseTX + 2 shared SFP.
- DIN-Rail and wall mount design.
- Multi-Power 24 up to 48 VDC.
- Optional model with SNMP management.

These switches offer a complete solution for Industrial Gigabit Ethernet Networks. Both models are ready for mounting them to DIN Rail and work with voltages between 24V and 48V DC.

The switches are 10/100/1000 Auto-MDI/MDIX on all ports. Port 7 and 8 are shared SFP slots meaning that the switch can easily be upgraded to fibre optic by inserting SFP (miniGBIC) modules. LIG612A has additional SNMP allowing redundant Ethernet Rings.

LIG612A

Item	Code
INDRy 1000, SNMP managed	LIG612A
INDRy 1000, unmanaged	LIG602A

Hardened Managed Ethernet Switches

Tough, multiport switches that provide economical ways to move data quickly—and reliably—in harsh environments.

- Operate in very hot and very cold conditions—even outdoors in sheltered locations.
- Offer bandwidth rate control and support IEEE 802.1p Quality of Service (QoS) for four priority queues.
- Support network redundancy, offering a recovery time of <15 ms and automatic link failover, as well as redundant power inputs.
- Manageable through an RS-232 console, Telnet, SNMP, RMON, a Web browser, or TFTP.
- Per-port programmable MAC address locking, up to 24 static secure MAC addresses per port, and MAC-based trunking.

These manageable switches are housed in IP30-rated metal cases to withstand temperatures ranging from -40 to +75° C. They're great for factory floors and traffic signal applications (the switches comply with the IEC 61000-6-2 EM sting for vibration resistance and shock, as well as NEMA TS1 and TS2 environmental requirements for traffic control equipment).

Fully manageable through SNMP, a Web browser, Telnet, or a console port, the switches are designed to integrate mixed-speed copper-only segments or 10-/100-Mbps copper networks with fiber backbones. You can control the maximum bandwidth on each port individually, as well as set up Quality of Service (QoS) priority queuing for critical applications.

Item				Code
Hardened Managed Ethernet Switches				
(8) 10-/100-Mbps Copper + (1) 1000-Mbps Fiber				
	Multimode	SC	2 km	LEH808-1GSXSC
	Single-Mode	SC	10 km	LEH808-1GLXSC10
			20 km	LEH808-1GLXSC20
(8) 10-/100-Mbps Copper + (2) 1000-Mbps Fiber				
	Multimode	SC	2 km	LEH808-2GSXSC
	Single-Mode	SC	10 km	LEH808-2GLXSC10
			20 km	LEH808-2GLXSC20

You may also need…

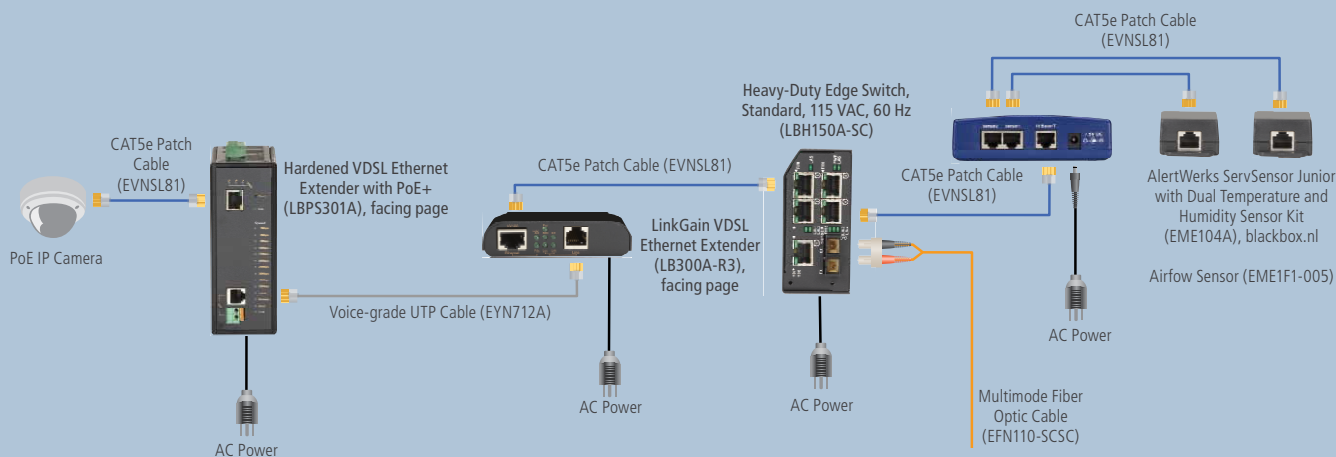|		Code
DIN Rail, 1-m		DR100
Rackmount DIN Rail, 1-m		EMEDIN
DIN Mount Power Supply	24-VDC	PSD012
	48-VDC	PSD014

Keeping an 👁 out.

Use your network for routine monitoring and surveillance.

Ethernet is turning up in some unexpected places—parking garages, convenience stores, dairy barns, and fire stations, to name just a few. It's become a universal connectivity solution, not just for PCs, but for a variety of systems that have little to do with what we think of as traditional computer applications—systems such as surveillance cameras, HVAC controls, environmental sensors, door access controls, smoke detectors, intrusion alarms, and more.

Ethernet's ability to support many different applications on one universal and relatively inexpensive network makes it possible to install building monitoring and surveillance systems that until recently would have required separate—and expensive—proprietary cabling. Through the use of Ethernet extenders, you can often even install these systems using voice-grade cable that's already installed, saving even more on cabling costs.

CAT5e Patch Cable (EVNSL81)

Heavy-Duty Edge Switch, Standard, 115 VAC, 60 Hz (LBH150A-SC)

CAT5e Patch Cable (EVNSL81)

CAT5e Patch Cable (EVNSL81)

AlertWerks ServSensor Junior with Dual Temperature and Humidity Sensor Kit (EME104A), blackbox.nl

CAT5e Patch Cable (EVNSL81)

Hardened VDSL Ethernet Extender with PoE+ (LBPS301A), facing page

CAT5e Patch Cable (EVNSL81)

LinkGain VDSL Ethernet Extender (LB300A-R3), facing page

Airfow Sensor (EME1F1-005)

PoE IP Camera

Voice-grade UTP Cable (EYN712A)

AC Power

AC Power

AC Power

AC Power

Multimode Fiber Optic Cable (EFN110-SCSC)

AC Power

▶ Power over Ethernet

The seemingly universal network connection, twisted-pair Ethernet cable, has another role to play, providing electrical power to low-wattage electrical devices via Power over Ethernet (PoE).

The original 802.3af PoE standard provides about 13 watts at 48 VDC over twisted-pair Ethernet cable to PoE-enabled devices such as IP telephones, wireless access points, and IP cameras. The newer 802.3at PoE standard supplies up to 25 watts to larger, more power-hungry devices and is backwards compatible with 802.3af.

The way PoE works is simple. Copper Ethernet cable consists of four twisted pairs of cable, and PoE sends power over these pairs to PoE-enabled devices. In one method, two wire pairs are used to transmit data, and the remaining two pairs are used for power. Or power and data may be sent over the same pair—power and data transmissions don't interfere with each other because electricity and data function at opposite ends of the frequency spectrum, they can travel over the same cable. Electricity has a low frequency of 60 Hz or less, and data transmissions have frequencies that can range from 10 million to 100 million Hz.

There are two types of devices involved in PoE configurations: Power Sourcing Equipment (PSE), which provide power over an Ethernet cable, and Powered Devices (PD), which receive power over an Ethernet cable.

Hardened VDSL Ethernet Extenders with PoE+

Extend Ethernet over voice-grade UTP cable in harsh environments.

- Extend 10BASE-T/100BASE-TX Ethernet across ordinary voice-grade copper wire.
- Supply power to 802.3at PoE devices.
- Support an extreme temperature range of -40 to +75° C.
- Support 50 Mbps for distances up to 300 m and 1 Mbps for distances of up to 1900 m.
- Four-port model features a built-in switch with four 10-/100-Mbps Ethernet ports; two ports support PoE.

The Hardened VDSL Ethernet Extender with PoE+ is ideal for last-mile applications. It extends Ethernet up to 300 meters at speeds of up to 50 Mbps. Plus, this extender is an 802.3at PoE PSE, providing up to 30 watts of power to a PoE powered device such as a switch or wireless access point.

Item	Code
Hardened VDSL Ethernet Extenders with PoE+	
1-Port	LBPS301A
4-Port	LBPS304A

Industrial VDSL2 Bridge

VDSL2 single port bridge equipped with our 10/100Mbps Ethernet ports.

- Long reach mode up to 1.9 km using 24AWG phone wire.
- Direct DC input with redundant dual 12-48VDC power input.
- Operating temperature from -20 up to 70°C.
- DIN-rail mountable IP30 metal case.
- Overload current protection.

MEG250AE

The new VDSL2 Bridge provides high speed transmissions using the telephone wires that are already installed within the facility. The bridge transmits data at 100 Mbps as well as broadband Multimedia services to all stations required. To configure for either local Central Office (CO) or remote customer premise equipment (CPE) operation, just flip a DIP switch.

Item	Code
Industrial VDSL2 Bridge	MEG250AE
12-VDC Din Mount Power Supply	PSD100-R2

Etherlink IV

Build up your metro network with tremendous 60Mbps DSL speeds.

MDS962AE

Also available as rack modules

- DSL Modems transmitting Ethernet over simple 2, 4 or 8 copper wires.
- Transparent connection.
- 15 Mbps on 2 wires, 30 Mbps on 4 wires and 60 Mbps on 8 wires.
- Point to Point, Point to Multipoint and Multidrop topologies.
- SNMP Manageable with or without IP (802.3ah).
- Built in Ethernet Switch.
- Integrated over voltage protection.
- VLAN802.1q support.

Item	Code
Etherlink IV	
2 wires 15Mbps	MDS962AE-10BT-R2
4 wires 30Mbps	MDS964AE-10BT-R2
8 wires 60Mbps	MDS968AE-10BT-R2

LinkGain VDSL Ethernet Extender

Point-to-point and plug-and-play— the simple way to extend your LAN at up to 50 Mbps.

- Save wiring costs by using voice-grade copper wire — even phone wire you already have installed.
- Extends 10- or 100-Mbps Ethernet up to 2 km.
- Perfect for connecting an isolated user in another building or in another part of a large building.
- Symmetrical VDSL supports speeds of up to 50 Mbps.
- Compatible with Hardened VDSL Ethernet Extenders with PoE+ (**above, left**).
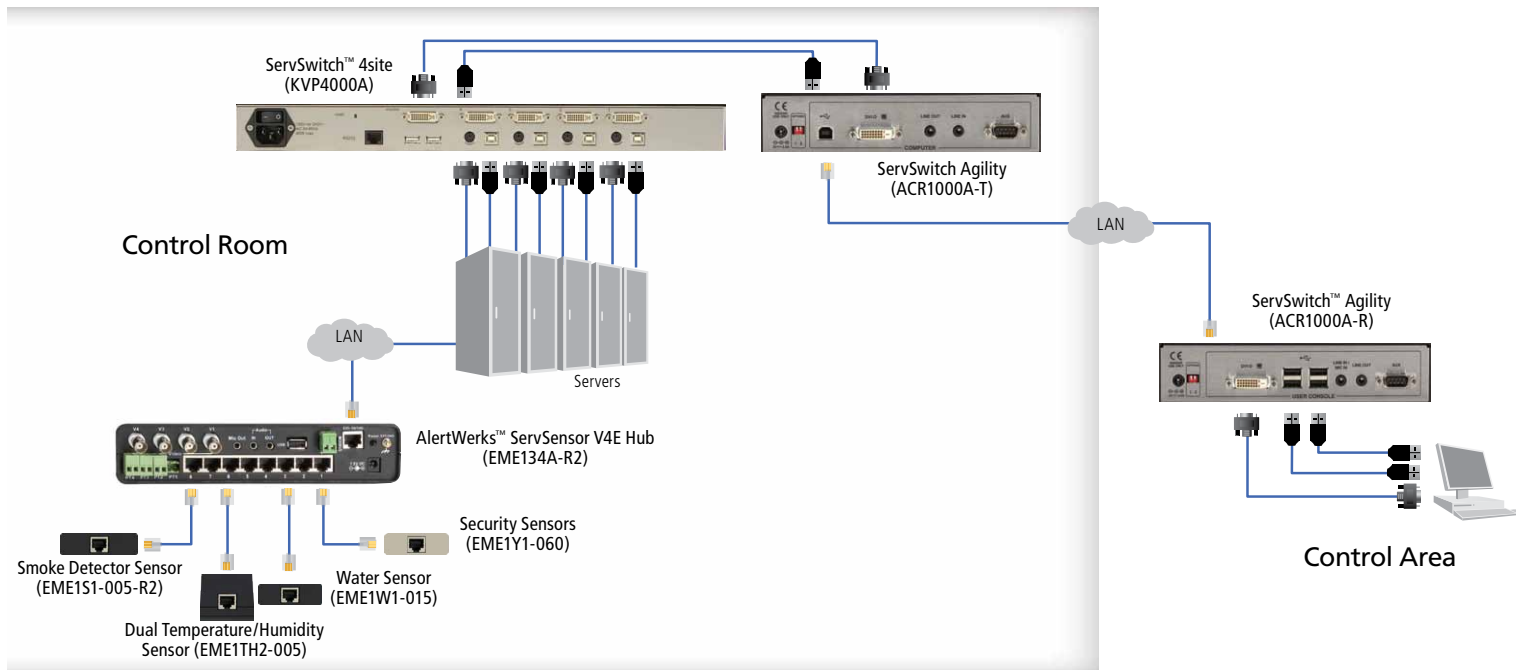- Rackmountable in the LinkGain Chassis (LB300A-RACK).

LB300A-R3

Item	Code
LinkGain VDSL Ethernet Extender	LB300A-R3
LinkGain 16-Slot Chassis, 19"	LB300A-RACK

Centralize control!

See and sense everything going on

Downtime in a control room means nothing but trouble and security risks. Snarled communications have no place in the data center. And when it comes to mission-critical equipment, there is no level of acceptable risk.

This is why we build control rooms in the first place, to be in control of the situation, whatever it may be. It's the one room designed for monitoring locations and equipment, and responding to any problems.
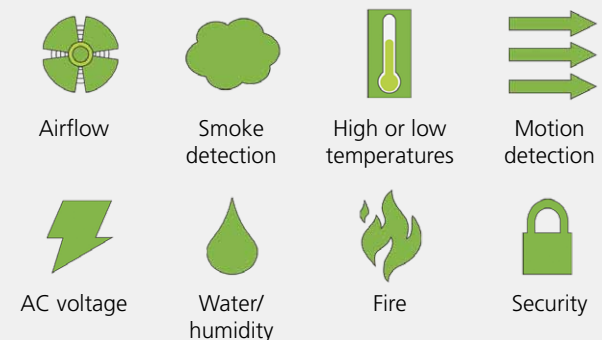
ServSwitch™ 4site
(KVP4000A)

ServSwitch Agility
(ACR1000A-T)

Control Room

LAN

LAN

Servers

ServSwitch™ Agility
(ACR1000A-R)

AlertWerks™ ServSensor V4E Hub
(EME134A-R2)

Security Sensors
(EME1Y1-060)

Smoke Detector Sensor
(EME1S1-005-R2)

Water Sensor
(EME1W1-015)

Dual Temperature/Humidity
Sensor (EME1TH2-005)

Control Area

AlertWerks™ ServSensor Hubs

Safeguard your infrastructure and resources with affordable monitoring hubs.

- Function as a central hub for AlertWerks Intelligent Sensors.
- Connect them to your network, attach AlertWerks sensors, and you're ready to remotely view the status of your data centers and other facilities.
- Work with a wide range of sensors: temperature, humidity, water, airflow, smoke, motion, security, dry contact, and AC and DC voltages.
- Java® based Web user interface enables you to access hubs over any IP network—even the Internet.
- Send alerts through SNMP or e-mail.
- The ServSensor V4E also supports up to four surveillance cameras.

EME134A-R2

Alertwerks Intelligent Sensors

Airflow	Smoke detection	High or low temperatures	Motion detection
AC voltage	Water/humidity	Fire	Security

A small selection:

Temperature sensor
(EME1T2-005)

Voltage sensor
(EME1A1-005)

Smoke detector sensor
(EME1S1-005-R2)

BLACK BOX
NETWORK SERVICES

Tech Support: 030-241 77 99 | Sales: 030-241 77 77
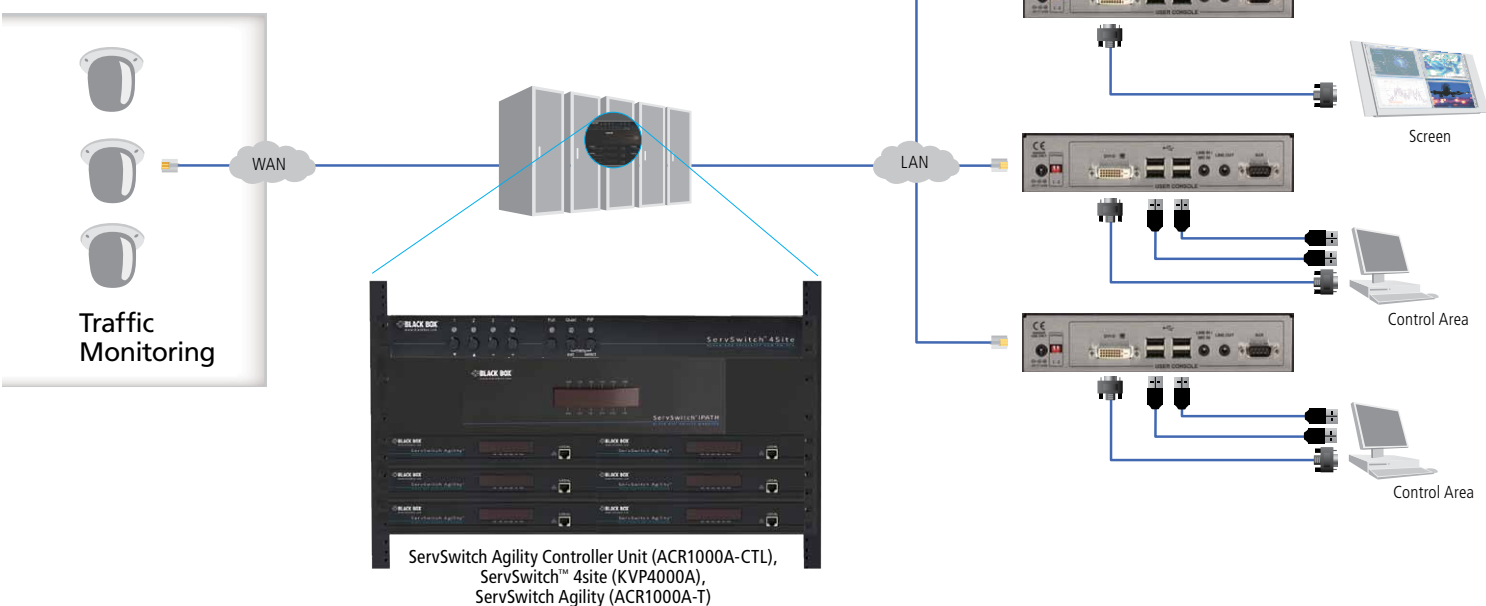
while having full control of the control room.

Environmental monitoring sensors with instant alerts, network multicasting and extended video feeds controlled from one keyboard/monitor/mouse setup, and video processors that deliver multiple views on one screen are just a few solutions to consider.

ServSwitch Agility
(ACR1000A-R)

Screen

Control Area

Control Area

Traffic
Monitoring

WAN

LAN

ServSwitch Agility Controller Unit (ACR1000A-CTL),
ServSwitch™ 4site (KVP4000A),
ServSwitch Agility (ACR1000A-T)

ServSwitch™ Agility DVI, USB, and Audio Extenders

Go farther, do more with digital KVM extension over IP.

- New flexible topology for KVM extension.
- Delivers perfect digital video with no loss.
- No-loss compression minimizes bandwidth use while maximizing the user experience.
- Configure your network to suit your needs: point-to-point extension, KVM switching, single-target sharing, or multicasting.
- Features keyboard/mouse emulation, and supports other standard devices, such as touchscreens or flash drives.
- Distance is only limited by your network capabilities.
- Mounting options include rackmounting, desktop, and wallmounting.

ACR1000A–T

ServSwitch 4site flex

Access up to four CPUs and monitor all simultaneously in real time.

- 4-to-1 KVM Switching with smooth real time image processing, DVI & VGA, HDMI, HDCP.
- Four display modes: Quad, Full Screen, Picture-in-Picture and Win Mode.
- Use the Win mode to freely resize and reposition the windows anywhere on the display. Use transparency to overlap.
- Switching via hotkey, hotmouse, OSD, external program or serial control device.
- Excellent video quality up to 1920 x 1200.
- Embedded digital audio.

KVP4004A

Wireless takes industrial applications to new places.

Wireless adds a new dimension to industrial connectivity, making it possible for operators to use portable handheld devices instead of being tied to a terminal.

Wireless in an industrial environment may be as simple as a wireless industrial modem that provides a serial link to distant industrial controls or as complex as wireless mesh Wi-Fi that also operates as an extension to a corporate network. New-generation wireless mesh has the capacity and flexibility to easily bring your industrial network to places that would have been impractical just a few short years ago.

The SmartPath wireless mesh can be used in a distribution-center environment, providing network connections to handheld bar code scanners and digital signage used by working pickers.

A distribution center can be a difficult wireless environment because it's always changing. SmartPath™ wireless mesh works reliably even if a forklift blocks an access point—workers always get a strong signal.

Note that the iCOMPEL appliance and monitor in this diagram have no connection to a wired network but are connected wirelessly through the iCOMPEL Wi-Fi Module.

Monitor in Display Enclosure
(ENC-42)

VGA Cable

iCOMPEL HD Digital Signage Appliance
(ICOMP02-H) with iCOMPEL Wi-Fi Module
(ICOMP-WIFI) in Wireless Cabinet (RM100A)

SmartPath Enterprise Wireless System

Fast, reliable, highly manageable wireless mesh for industrial and general use.

- Fast 802.11n throughput rivals that of wired networks.
- Supports video and VoIP communications.
- Advanced controller-less architecture.
- Access points (APs) work together to improve throughput and provide redundancy.
- Secure. Access enforced by per-user policies and SLAs.
- System supports legacy 802.11b/g wireless devices with no degradation in 802.11n performance.
- Easy to manage via cloud-based service or appliance.
- Resilient. No bottlenecks or single points of failure.
- PoE-powered APs reduce power infrastructure needs.
- Indoor and hardened AP models available.
- Hardened version: antennas not included.

The SmartPath Enterprise Wireless System from Black Box combines the stability, security, and speed of a wired network with the versatility and adaptability of a wireless network. It enables you to set up fast, 802.11n standard Wi-Fi communications in a logical way.

The technology differs greatly from most wireless technology available today because it's based on wireless mesh access points that intelligently route packets and make policy decisions at the network's edge.

With SmartPath, you get enterprise-class access points (APs) plus cloud-based management and security functions that provide all the benefits of a controller-based wireless LAN (WLAN) solution — without requiring a controller or an overlay network.

SmartPath access points work together to improve throughput and provide redundancy for all your 802.11n wireless devices, making a very cost-effective solution for either new WLAN networks or for upgrading enterprise wireless.

Hardend version (LWN602HAE)

No expensive controllers needed!

LWN602AE

▶ Why SmartPath is an ideal wireless choice for industrial environments

1. SmartPath can route data between access points. Wireless mesh enables you to place access points in areas that are difficult or impossible to wire.

2. Because it uses speedy 802.11n, SmartPath can support even relatively high-bandwidth applications such as digital signage.

3. 802.11n provides far better coverage and performance than older 802.11g wireless—even in areas with many surfaces.

5. SmartPath compensates for disabled access points, so it works well in industrial settings where access points may be periodically blocked by machinery or vehicles.

6. The SmartPath Hardened Access Point is sealed against moisture and contaminants and supports a temperature range of -20 to +55° C.

7. SmartPath supports seamless roaming between subnets. Users with portable devices such as handheld scanners and smartphones can transparently travel from access point to access point and from subnet to subnet without losing their session or needing to log on again.

Altitude 4532 Access Point

High-performance, Dual Radio, Independent 2x3 MIMO 802.11 abgn (2.4/5GHz) Access Point

The Altitude™ 4532 supports three modes of operation. First, the device can operate as a traditional access point (AP), controlled with a Summit® WM controller. The Altitude 4532 continues to operate if connectivity to the controller is lost, for robust data forwarding.

Second, the AP can act as a standalone access point without a controller. Finally, it can operate as a virtual controller allowing it to control up to 24 other similar devices.

Internal and external antenna options

Performance
- 2x3 MIMO
- 802.11 abgn (2.4/5GHz)
- 24 dBm Max Output
- GigE Uplink

Form Factor
- Dual Radio
- Independent AP
- Wall or Ceiling Mount

Features
- Multiple Modes of Operation
- Layer 2-7 Stateful Packet Filtering Firewall
- Wireless IPS
- VPN Gateway
- SMART RF
- Internal and External Antenna Options
- Hotspot
- Guest Access

Call for more information.

Item	Code
Altitude AP4532i dual-radio Independent indoor Access Point, includes internal omni-directional antennas	AP4532i EU
Altitude AP4532e dual-radio Independent indoor Access Point, external antennas not included	AP4532e EU

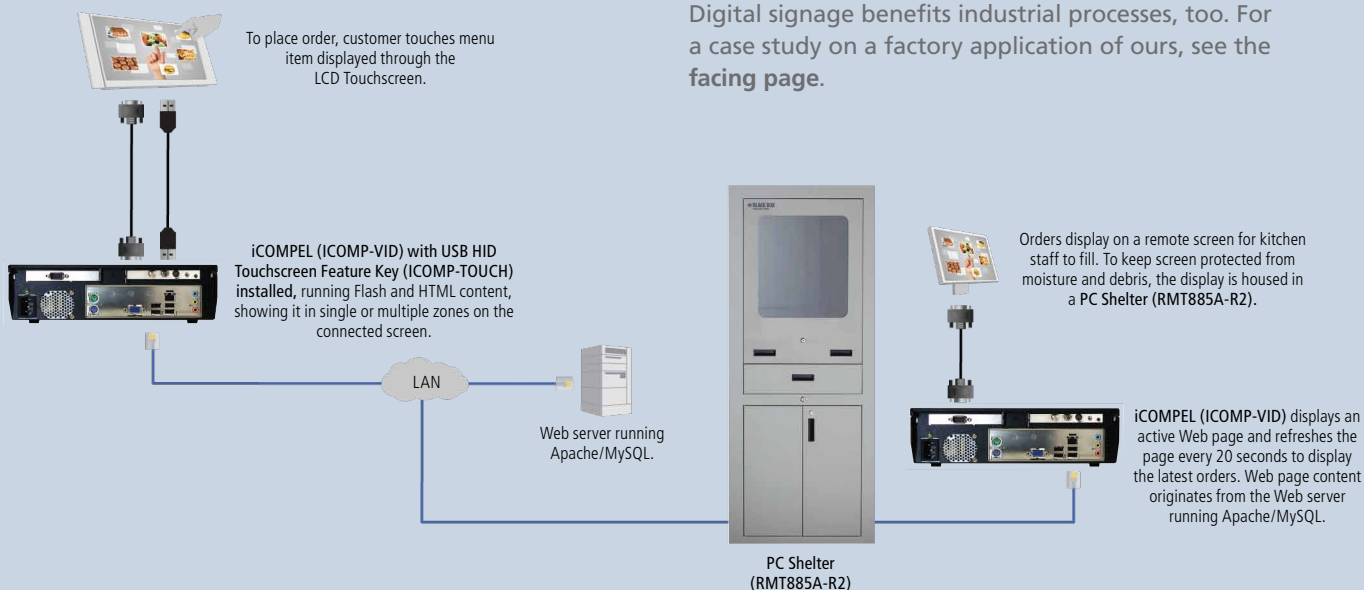# Advertise, Inform, Alert, Improve Your Processes

Improve communication, motivate employees and customers, and drive more business.

Digital signage. No other medium makes it possible to deliver important info at the right location at the right time for maximum impact — even in often messy cafeteria environments.

With it, you have a dynamic platform to accurately relay orders in real time from touchscreens to kitchen staff (see diagram **below**). Worried about splashing liquids? Add a PC Shelter to keep electronics safe.

Digital signage benefits industrial processes, too. For a case study on a factory application of ours, see the **facing page**.

To place order, customer touches menu item displayed through the LCD Touchscreen.

iCOMPEL (ICOMP-VID) with USB HID Touchscreen Feature Key (ICOMP-TOUCH) installed, running Flash and HTML content, showing it in single or multiple zones on the connected screen.

LAN

Web server running Apache/MySQL.

Orders display on a remote screen for kitchen staff to fill. To keep screen protected from moisture and debris, the display is housed in a **PC Shelter (RMT885A-R2).**

iCOMPEL (ICOMP-VID) displays an active Web page and refreshes the page every 20 seconds to display the latest orders. Web page content originates from the Web server running Apache/MySQL.

PC Shelter
(RMT885A-R2)

iCOMPEL™ Integrated Hardware/Software Platform

Set up vibrant, real-time digital displays easily and affordably!

- An all-in-one, plug-and-display solution — sets up *FAST*.
- Works right out of the box with all software preinstalled and tested, plus FREE updates and no ongoing SaaS or licensing fees — resulting in a low cost of ownership.
- Scalable. Can be used with one screen or networked to multiple screens.
- Easy to control via a standard Web browser connection.
- Includes FREE professionally designed screen layouts.
- Supports touchscreens and motion detection devices.
- Enables you to customize screens with a mix of zones showing video, logos, text, HTML, RSS, and XML feeds. Supports multiple video zones — show video side by side!
- Also available: subscriber players for 802.11n wireless communications.

ICPS-2U-PU-N

Visit blackbox.nl for more information.

BLACK BOX CASE STUDY

Joy Mining Machinery

Project: New digital signage network

Major benefit: Improved productivity and morale

Major challenge: Centralizing control of the company's branding and messaging

The background.

Active on five continents and with a network of 55 facilities spanning China, Russia, India, Poland, the United Kingdom, Australia, South Africa, and the United States, Joy Mining Machinery, a subsidiary of Joy Global, Inc., is a worldwide leader in the manufacture of underground mining equipment. Wherever coal, iron ore, copper, and other embedded materials are mined, chances are good that Joy Mining loaders, conveyors, and other products are hard at work.

Because Joy Mining customers and employees are spread from Tychy, Poland to Tianjin, China, the Joy Mining Machinery marketing team proposed a network of digital video displays in facility lobbies to convey both local and company-wide information, all with a consistent look.

"We knew that to control the branding and messaging, we would have to manage the network from our graphics and video production unit," recalled Chuck Fickter, Marketing Information Manager for Joy Mining. "The only way to do that is with a powerful, easy-to-operate content management system."

The solution.

The Joy Mining team discovered iCOMPEL™ from Black Box. "Many of the units we looked at were complicated to use. Others didn't have all the functions we wanted," Fickter said. "But iCOMPEL is very easy to hook up, with software that's easy to learn."

Nearly all the company's 55 facilities eventually received a digital display in their lobbies, all controlled by iCOMPEL devices. But little did anyone know at that point how far the project would go. First, the company's engineering staff came to Fickter with an idea. "We were presented with the notion of using the digital screens to provide engineering metrics — performance data and the like. We saw the potential and immediately began rolling out the information to 19 screens around the network," says Fickter.

Possibly the most innovative idea, however, came from a company task force working to optimize manufacturing quality and efficiency. Its proposal: Use digital screens on the factory floor to display "Kanban" inventory information in real time. Kanban, a Just-in-Time manufacturing discipline, tells workers which parts are in inventory, which are in transit, and in what bins particular parts are found. It also feeds information back to off-site fabricators, ensuring that appropriate parts are being produced only as needed, and just in time for use.

"To execute the Kanban idea, we needed to pull information from our SAP Enterprise Resource Planning system. All we had to do was create a Web service by pointing our iCOMPEL units to the correct IP address," says Fickter.

Joy Mining has installed a number of Kanban displays at its Franklin, PA manufacturing plant with impressive results. Its next move is to link the Franklin facility to other Pennsylvania plants as well as its South African operations.

Display Enclosures

Protect your expensive displays indoors and out!

- A fully sealed and tamper-resistant, key-locked enclosure for protecting expensive LCD screens in digital signage applications.
- Anti-reflective window on the front enables clear viewing when the cover is closed.
- Integrated fan cooling, exhaust ports, and air movement features. Display depth allows air to circulate at the front of the window. (AC cooling also available as option.)
- Cable entry from behind.
- Durable aluminum body with silver finish. Custom colors also available to match your organization's color scheme.

Call us for more information.

Black Box provides the best storage for your equipment.

A shelter for every application.

Cabinets and racks are not just for data centers—they can provide support and protection for your equipment in any setting. Choose racks for easy access to equipment. Enclosed cabinets provide varying degrees of protection ranging from a simple locked door up to a complete climate-controlled, sealed environment.

Elite Cabinets

Choose Elite™ Cabinets for top-of-the line custom cabinets.

- More features, more choices, more cable management, more sizes, more versatility than any other Black Box cabinet.
- Heavy-duty, welded steel construction.
- Come with the protection of a lifetime Black Box® Double Diamond™ warranty.

For example, 45U Elite Cabinet 600 W x 900 D, mesh front and rear doors, mesh top panel (EC45U6090SMMSMNK):

Visit blackbox.nl for different sizes and options.

NEMA 4X Equipment Cabinet

Secure equipment housing.

- Constructed of molded fiberglass polyester that doesn't interfere with wireless signals.
- Includes ¾" plywood mounting panel.
- Integral DIN boss plus a molded boss on the door.
- Seamless door gasket.
- Cabinet can be rotated 180 degrees for left or right door opening.
- Door opens 180 degrees.
- Molded-in drip shields.
- Replaceable breakaway hinges.
- Plenum rated.
- Measures 62.5H x 61,2W x 32D cm.

Item	Code
NEMA 4X Equipment Cabinet	RM900A

NEMA 12 Wallmount Cabinets

Tough enclosures built to keep components safe!

- Independently tested and certified to NEMA-250-1997 Type 12 standard. Meets guidelines for protection against dirt, dust, and noncorrosive liquids.
- Choose from three heights: 12U, 19U, and 26U.
- Feature a maximum weight capacity of 68, 113 or 136 kg to mount heavy servers and other hardware.
- For security, front and rear sections lock independently.

RMN650A-R2

Visit blackbox.nl for different sizes.

Wallmount ClimateCab

No cooling available? No problem. Just use a self-contained ClimateCab.

Read about NEMA ratings on page 3.

RMW5130ACE

- NEMA 12 rated for protection against falling dirt, circulating dust, lint debris, and splashing liquids in indoor environments.
- Includes 19" rails with M6 mounting holes.
- Scratch resistant safety glass window provides easy viewing.
- Fully welded body and door construction.
- Robust 12-gauge frame and 14 or 16 gauge sides and doors.
- Seamless door gaskets keep out dust and contaminants.
- GO GREEN – save energy and money by cooling only the cabinet rather than the whole room or IT centre.

Item	Code
Wallmount ClimateCab, Fan/Ambient Air	RMW5120AFE
Wallmount ClimateCab, 800BTU (235W)	RMW5130ACE
Visit blackbox.nl for different sizes and options.	

Wireless Cabinet

Shelter equipment without shuttering the signals of wireless devices.

- Fiberglass construction enables wireless signals to pass through.
- NEMA 4X rated, so it can be used indoors and out.
- Protects against windblown dust and rain, splashing water, corrosion, and ice formation.
- Seamless gasket provides a watertight and dust-tight seal.
- Fiberglass polyester resists chemicals and withstands temperature changes.
- Removable, plenum-rated solid front door.
- Measures 45,7H x 40W x 25D cm.

Item	Code
Wireless Cabinet	RM100A

ClimateCab goes to school—and gets an A+.

Case Study

Tight on space, a school district was housing IT equipment in a storage room at an elementary school. Not only was the room dusty, it also got very hot in the summer. The school district needed a comprehensive solution for housing its equipment that would be cost-effective and protect electronics from dirt and heat.

The school chose a 42U NEMA 12 ClimateCab from Black Box with an 8500-BTU air-conditioning unit for its storage room. The district moved IT equipment from two other manufacturers' cabinets into the Black Box ClimateCab. The equipment now stays at a cool 26° regardless of the ambient temperature of the room.

The school district saves money by not having to cool the entire room or replace costly equipment. In fact, it plans to implement the ClimateCab solution in all the other schools in the district — multiplying its savings for each school.

A few years ago Akzo Nobel in Belgium used the Black Box LaserLink solution to connect several offices. Visit blackbox.nl to read the case study.

AKZO NOBEL

Wireless in an industrial setting

Industrial and manufacturing enterprises are also discovering wireless technology. Used in industrial settings, wireless offers many of the same advantages: lowering costs by eliminating the need for cabling and bringing the flexibility of wire-free networking. In an industrial setting, wireless can help lower energy and material consumption, lower production costs and increase productivity.

Wireless products intended for industrial settings differ from ordinary wireless products in important ways: they emphasize reliability over speed, they're housed in heavy-duty enclosures and they're not standardized.

Slow and steady
In industrial applications, reliability is more important than speed. The data being transmitted is usually simple sensor or control data, which requires very minimal bandwidth.

Reliability in industrial applications is, however, of utmost importance. When you're communicating with the sensors and controls to devices that are often very large and expensive—and often dangerous—you want to be sure the data goes through. Plus, industrial environments are often difficult for wireless transmission because of long distances, and interference from large motors and reflective metal surfaces. For these reasons, wireless devices built for industrial use tend to be very slow but quite reliable.

Tough as nails
Industrial environments can be tough, exposing electronics to vibration, dust, moisture and extreme temperatures. For this reason, industrial wireless devices are usually housed in far more robust enclosures than devices intended for office environments. Standard features to look for are heavy-duty steel cases, water resistance, dust resistance and extended temperature ranges.

▼ Why go wireless?

- It's great for communicating in harsh climates or in areas where it's expensive to run cable. Wireless solutions are well suited for use in military applications, farming, refineries, mining, construction, and field research.
- Because sometimes you just can't run wire, like in historic buildings or hazmat areas.
- When it's physically or legally impossible to support conventional hard-wired RS-232 communications, wireless networking may be your only answer.

- It gives you quick, temporary connections at trade shows, and fast reconfigurations—even troubleshooting or remote field testing.
- It provides reliable disaster relief when all else fails! Count on wireless networks to maintain mission-critical links when disaster strikes.
- It's more affordable, more reliable, and faster than ever before.

Gigabit Laserlink Autofocus PoE 500

Fast, reliable and secure point-to-point Fast Ethernet communication.

- Full duplex Gigabit wire-speed up to 500 meters.
- Built-in Management with SNMP.
- Easy power able with Power over Ethernet.
- Automatic beam divergence setting and beam calibration.
- Movement compensation.
- Industry standard fibre optic interfaces.
- Secure data transmission.
- License free operation.

The Gigabit LaserLink PoE Autofocus system provides an increased reliability through an advanced technology improvement, which dynamically changes the shape to the transmitting laser beam. If the weather gets bad the transmitting beam size will decrease to concentrate the optical power distributed. This way the Gigabit LaserLink Autofocus series will have a higher reliability figure.

1000 Mbps over 100 to 500 meters without wires.

Item	Code
Gigabit LaserLink Autofocus PoE 500, 100-500 m	
Standard	LWU0500GB-POE-AFM
With heater	LWU0500GB-POE-AFMH

Wireless Point-to-Point Ethernet Extender Kit

Extend Ethernet links between buildings wirelessly and with ease. No cables needed!

- Affordable, point-to-point wireless Ethernet extension up to 10 km.
- Simple to install and configure—extenders are pre-synchronized to work with each other.
- Features 802.11n wireless for fast throughput—40 Mbps at up to 5 km.
- LED indicator simplifies configuration and alignment.
- Easily managed through a Web-based interface.
- Features an 8-dBi internal antenna or can used with an external antenna.
- Powered through the Ethernet cable—no outdoor power outlet needed.
- 10/100Mbps Ethernet port with MDI/MDI-X.

The Wireless Point-to-Point Ethernet Extender Kit gives you a quick way to extend an Ethernet link between buildings. Because it's wireless, you avoid the hassle and expense of laying cable.

Tough waterproof enclosure for outdoor use

Kit includes PoE injectors and pole-mounting rings.

Item	Code
Wireless Point-to-Point Ethernet Extender Kit	LWE100AE-KIT
TerraWave Fiberglass Omnidirectional Antenna 2.4 Ghz	T24100O10006S
TerraWave 2.4-GHz Directional Panel Antenna, 19 dBi	T24190P10006GT

Antenna Considerations

Antenna selection will depend on your communications needs, with system array and range being the biggest factors.

Two Types of Antennas

Directional
Sends and receives the signal in a single direction. A directional antenna gives you the longest range. Examples: Yagi, Dish, and Panel.

Omnidirectional
Sends and receives the signal in a radius. This antenna allows the largest number of nodes. Examples: Vertical Omnis, Ceiling Domes, and Rubber Ducks.

Line of Sight

RF signals travel in curved elliptical paths, rather than in straight lines as light does, resulting in a signal path that resembles a football in shape, so called Fresnel-zones. Interference can occur at any point within this area.

A sight-survey is usually needed to estimate risks now and in the future. For example, trees may not be a problem now, but they may grow 'into' the Fresnel-zone.

For maximum communications, the fewer barriers along the line of sight between receiver and transmitter, the better. Frequency and transmit power levels have the most impact on how well the signal can negotiate physical and EMI line of sight barriers.